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(54) **TRANSMISSION DEVICE**

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B65H 3/06 (2006.01)
G03G 15/00 (2006.01)

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CPC ***B65H 3/0669*** (2013.01); ***B65H 5/066*** (2013.01); ***G03G 15/602*** (2013.01); *B65H 2403/42* (2013.01); *B65H 2403/50* (2013.01); *B65H 2403/722* (2013.01); *B65H 2403/942* (2013.01); *B65H 2513/412* (2013.01)

(58) **Field of Classification Search**
CPC B65H 3/0669; B65H 2403/50; B65H 2403/722; B65H 2403/942; B65H 2513/412; B65H 2403/42; B65H 5/06; G03G 15/602
USPC 271/10.04; 399/367
See application file for complete search history.

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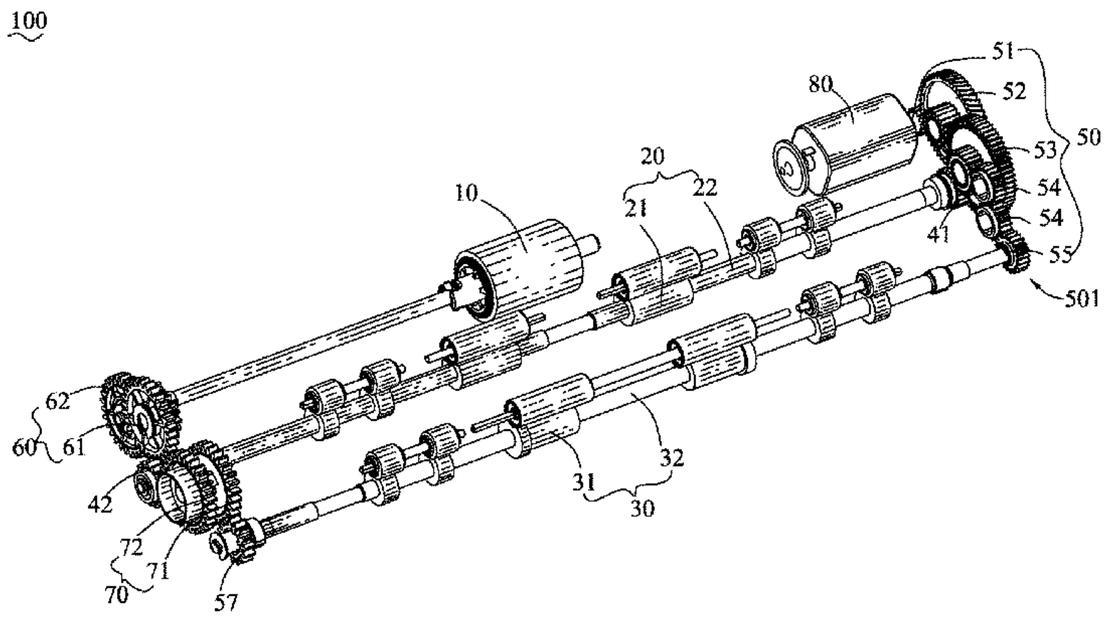
(57) **ABSTRACT**

A transmission device includes a pickup roller assembly, a feeding roller assembly including a feeding shaft, a paper-out roller assembly including a paper-out shaft, a driving motor, a one-way drive gear module, a first transmission gear module, a second transmission gear module and a one-way clutch. The first transmission gear module includes a plurality of transmission gears disposed to two ends of the feeding shaft and two ends of the paper-out shaft. The second transmission gear module is engaged with one of the transmission gears mounted around one end of the feeding shaft. The one-way clutch disposed between the feeding shaft and the paper-out shaft, includes a first clutch gear, a second clutch gear, a third one-way clutch gear disposed between the first clutch gear and the second clutch gear, and a compression spring disposed to one end of the second clutch gear.

4 Claims, 6 Drawing Sheets



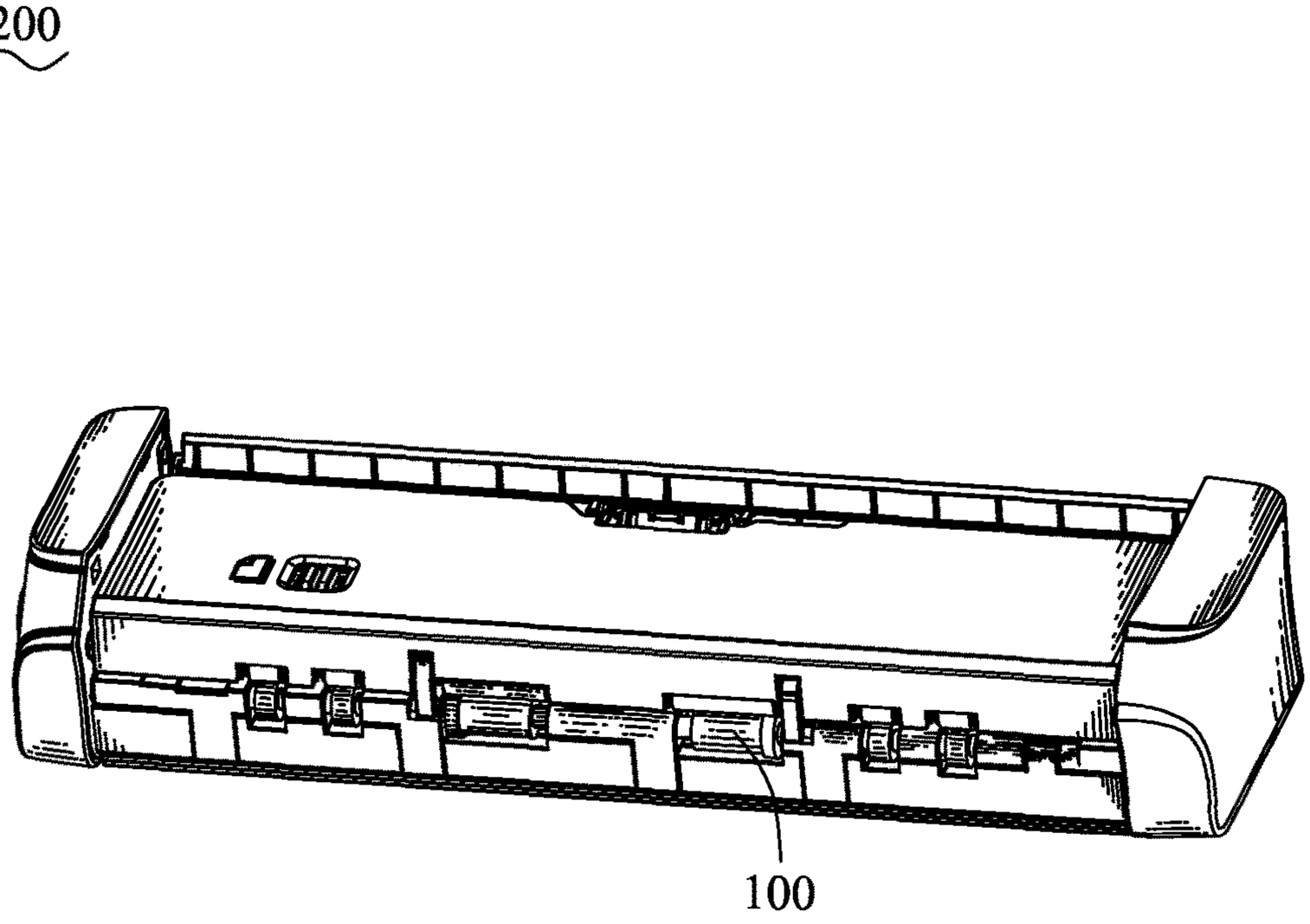


FIG. 1

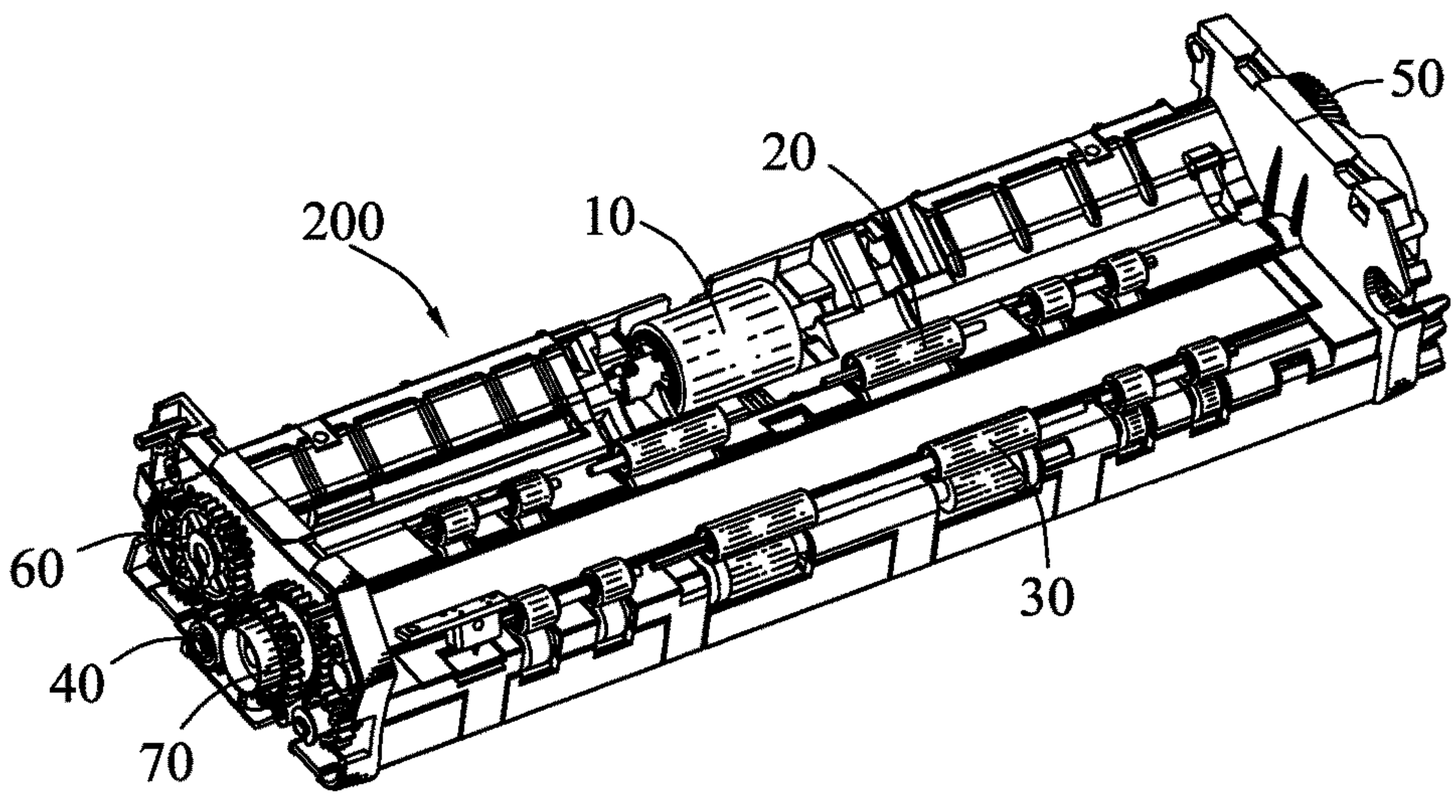


FIG. 2

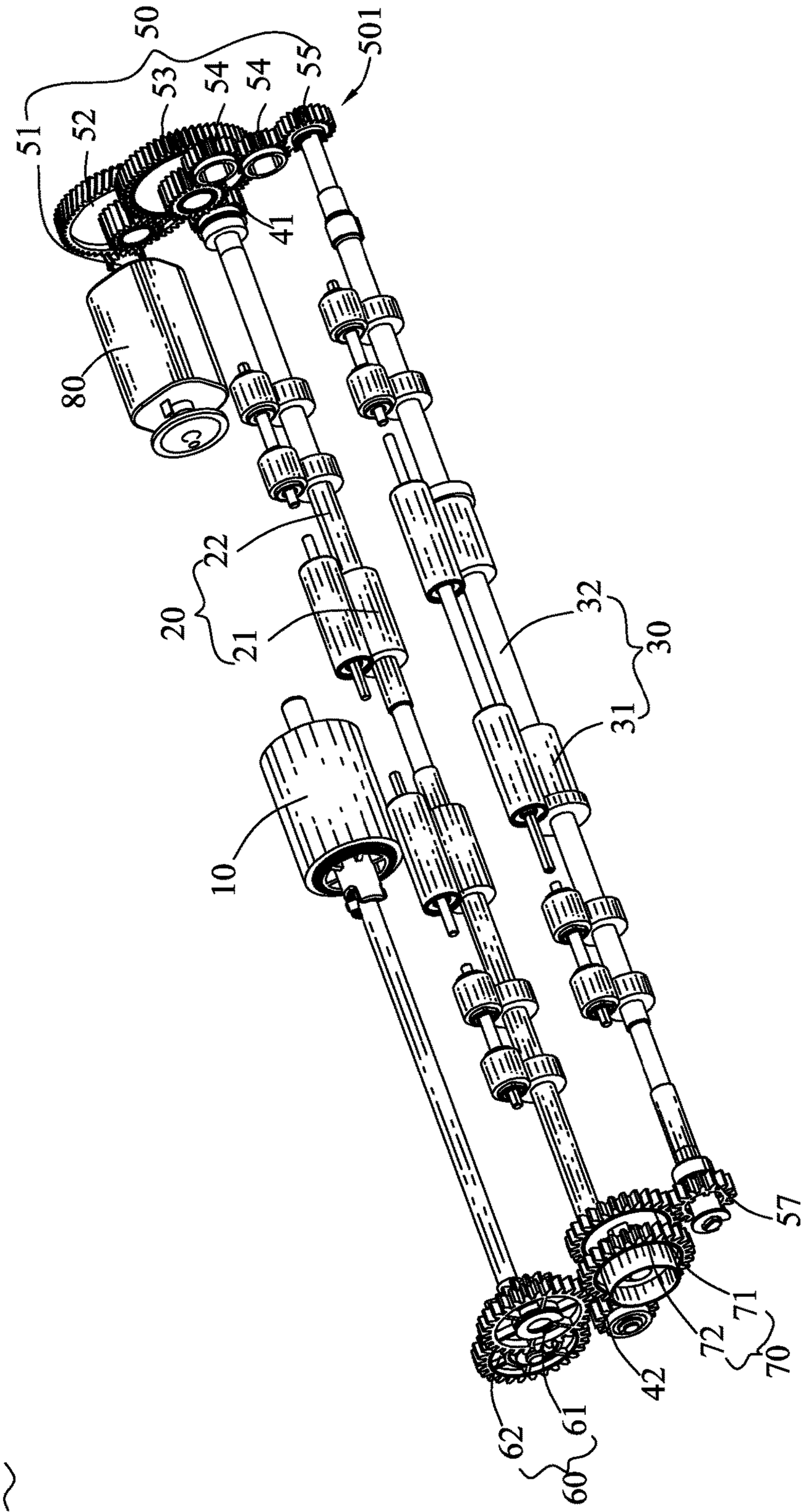

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FIG. 3

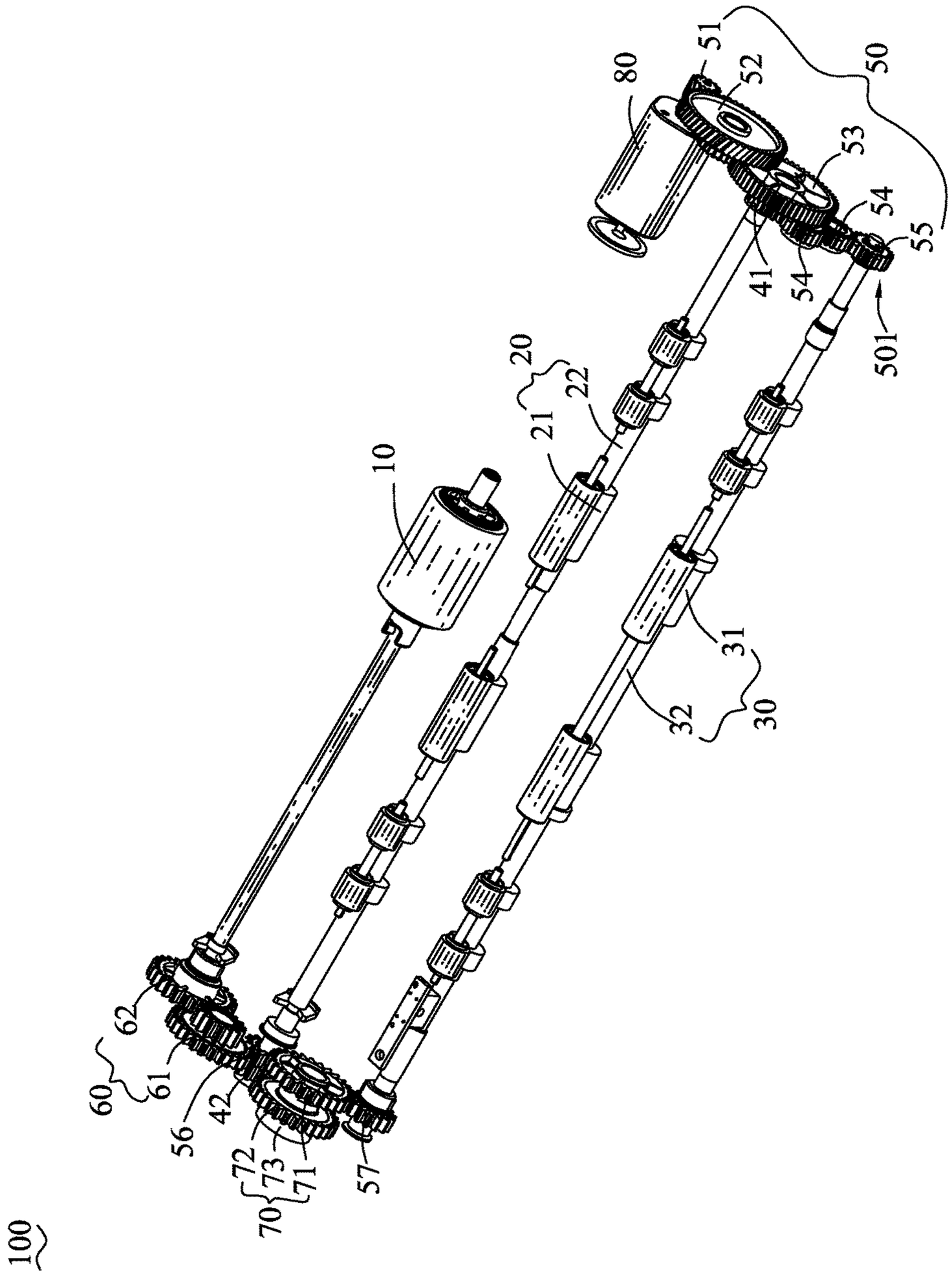
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FIG. 4

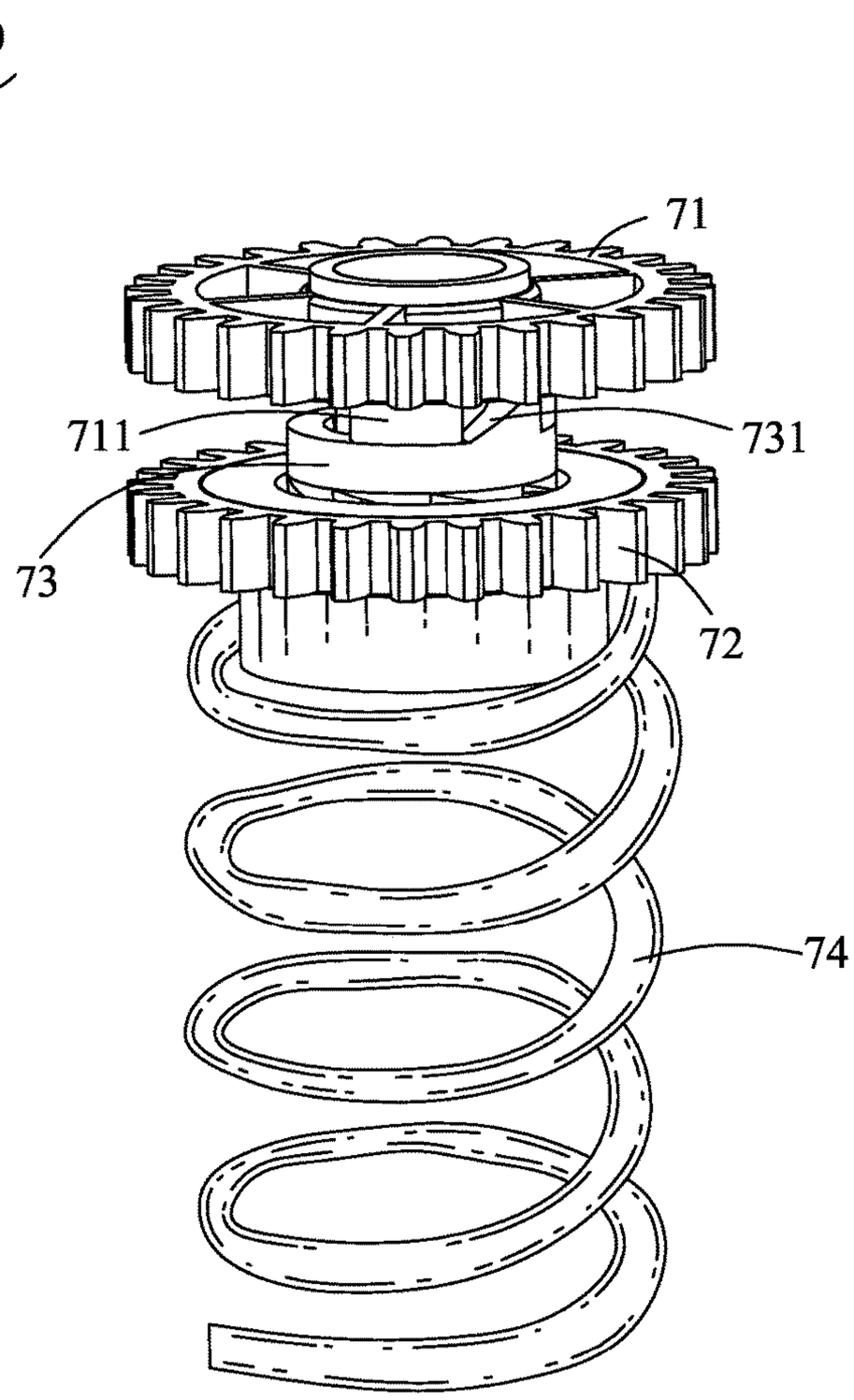

FIG. 5

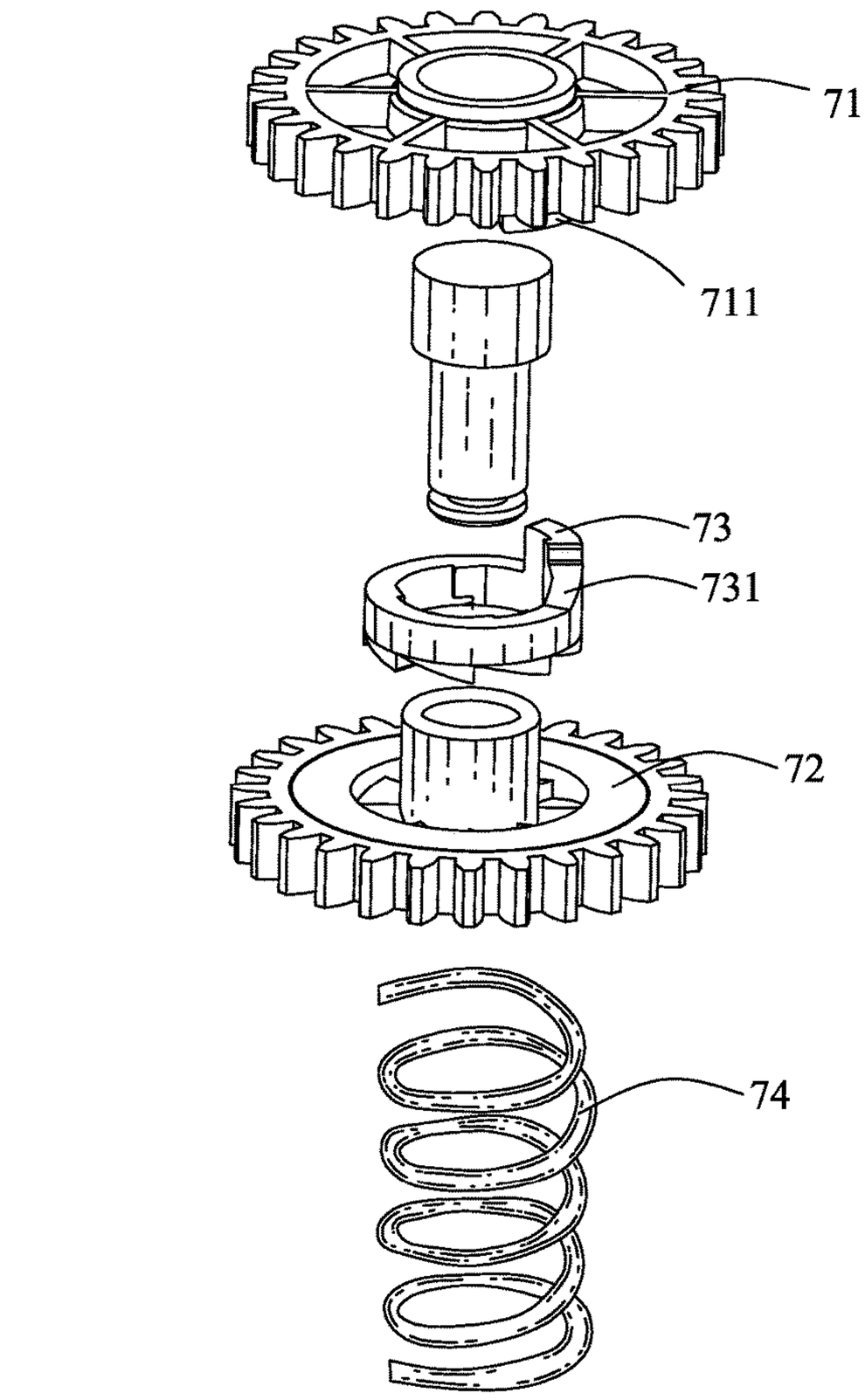

FIG. 6

TRANSMISSION DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to a transmission device, and more particularly to a transmission device assembled to an automatic sheet feeder.

2. The Related Art

With the improvement of softwares and hardwares, a conventional scanner has become one of basic equipments of many computer users. The conventional scanner is capable of scanning and inputting character and image materials into a computer, and processing the character and image materials. The character and image materials include paper documents, magazines, books, pictures and cards. The conventional scanner includes a scanning unit and a transmission device. When the paper documents are to be scanned in one way, the scanning unit is disposed under the horizontally placed paper documents, a motor, a gear assembly, a transmission belt and other transmission mechanisms of the transmission device are needed for driving the scanning unit to scan the paper documents. When the paper documents are to be scanned in another way, keep the scanning unit being without moving, the transmission device drives the paper documents to be scanned for achieving an image scan purpose. In order to increase a scan efficiency of the conventional scanner scanning the paper documents in the latter way, the conventional scanner is generally equipped with a current automatic sheet feeder.

The current automatic sheet feeder has a channel for transmitting the cards. The current automatic sheet feeders are generally equipped with different transmission devices to control an entrance and a scan of each of the cards. The transmission device is assembled to the current automatic sheet feeder. When one of the cards is being scanned, a tilt phenomenon will be caused at the time of the one of the cards entering the current automatic sheet feeder. Moreover, the current automatic sheet feeder includes a pickup device and a paper feeding roller, and the current automatic sheet feeder mostly uses at least two motors, or uses a clutch device, an electromagnetic valve device and so on to drive the pickup device and the paper feeding roller.

However, if the transmission device of the current automatic sheet feeder is equipped with more motors, a manufacturing cost of the transmission device will be increased, and a volume of the transmission device is hardly miniaturized.

In order to overcome the shortcomings described above, it is essential to improve the current automatic sheet feeder and the transmission device of the current automatic sheet feeder, so an innovative transmission device assembled to an automatic sheet feeder need be provided.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a transmission device assembled to an automatic sheet feeder. The transmission device includes a pickup roller assembly assembled to the automatic sheet feeder, a feeding roller assembly assembled to the automatic sheet feeder, a paper-out roller assembly assembled to the automatic sheet feeder, a driving motor for driving the pickup roller assembly, the feeding roller assembly and the paper-out roller assembly, a

one-way drive gear module driven by the driving motor, a first transmission gear module, a second transmission gear module disposed to one end of the pickup roller assembly, and a one-way clutch. The feeding roller assembly includes a feeding shaft and a feeding roller mounted around the feeding shaft. The paper-out roller assembly includes a paper-out shaft, and a paper-out roller mounted around the paper-out shaft. The one-way drive gear module includes a first one-way drive gear and a second one-way drive gear. The second one-way drive gear is mounted around one end of the feeding shaft, and the first one-way drive gear is mounted around the other end of the feeding shaft. The first one-way drive gear and the second one-way drive gear rotate in different directions to drive the feeding shaft to rotate. The first transmission gear module includes a plurality of transmission gears disposed to the two ends of the feeding shaft and two ends of the paper-out shaft. The first one-way drive gear is engaged with one of the transmission gears disposed to the other end of the feeding shaft. The driving motor drives the first transmission gear module to drive the first one-way drive gear so as to drive the feeding roller assembly to rotate in one direction. The driving motor drives the first transmission gear module to drive the paper-out roller assembly to rotate in different directions. The second transmission gear module is engaged with one of the transmission gears of the first transmission gear module mounted around the one end of the feeding shaft. The driving motor drives the first transmission gear module to drive the first one-way drive gear to rotate in the one direction to drive the feeding shaft to rotate in the one direction for driving the one of the transmission gears of the first transmission gear module mounted around the one end of the feeding shaft to drive the second transmission gear module so as to drive the pickup roller assembly to rotate in the one direction. The one-way clutch is driven by the driving motor and disposed to the one end of the feeding shaft and one end of the paper-out shaft, and is disposed between the feeding shaft and the paper-out shaft. The one-way clutch includes a first clutch gear, a second clutch gear, a third one-way clutch gear disposed between the first clutch gear and the second clutch gear, and a compression spring disposed to one end of the second clutch gear. The first clutch gear is engaged with one of the transmission gears of the first transmission gear module which is mounted around the one end of the paper-out shaft. The second clutch gear is engaged with the second one-way drive gear which is mounted around the one end of the feeding shaft. The compression spring presses the second clutch gear to make the second clutch gear avoid rotating when the third one-way clutch gear idles. The third one-way clutch gear is capable of being engaged with the second clutch gear to make the second clutch gear rotate in a single direction.

As described above, the driving motor rotates in a reverse direction to drive the first transmission gear module to drive the first one-way drive gear rotate in a forward direction so as to drive the feeding roller and the paper-out roller to rotate in the forward direction, the first transmission gear module drives the pickup roller assembly to rotate in the forward direction by the second transmission gear module, and the feeding roller and the paper-out roller rotate in the forward direction, one of the paper documents is conveyed successfully to be scanned. The driving motor rotates in the forward direction to drive the paper-out roller to rotate in the reverse direction by virtue of the first transmission gear module, the first one-way drive gear rotates in the reverse direction to make the first one-way drive gear idle to have no way of driving the feeding roller to rotate in the reverse direction,

and the first clutch gear is driven to rotate in the forward direction by virtue of the second transmission gear module to bring one of the cards enter the automatic sheet feeder, the one of the cards is driven to arrive at the feeding roller which is without rotating, a rear end of the one of the cards pushes against the feeding roller for realizing a function of correcting a skew of the one of the cards, after the first clutch gear is driven rotate a set distance, a first protruding portion of the first clutch gear pushes against an inclined surface of the third one-way clutch gear to make the third one-way clutch gear engaged with the second clutch gear and drive the second clutch gear to rotate in the forward direction and drive the second one-way drive gear and the feeding shaft to rotate in the reverse direction so as to drive the first one-way drive gear rotate in the reverse direction to make the first one-way drive gear idle, the feeding roller and the paper-out roller rotate in the reverse direction to drive the one of the cards to continue being conveyed until the rear end of the one of the cards breaks away from the feeding roller, the driving motor stops rotating in the forward direction, then, the driving motor starts rotating in the reverse direction, the feeding roller and the paper-out roller are driven by the first transmission gear module to rotate in the forward direction so as to convey the one of the cards to proceed being scanned until the one of the cards completes being scanned, the one of the cards is transmitted out from a front end of the automatic sheet feeder. Moreover, the transmission device of the automatic sheet feeder is equipped with just the driving motor which is capable of simultaneously driving the pickup roller assembly, the feeding roller assembly and the paper-out roller assembly to avoid the transmission device using more motors, so a manufacturing cost of the transmission device will be decreased, and a volume of the transmission device is easily miniaturized.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be apparent to those skilled in the art by reading the following description, with reference to the attached drawings, in which:

FIG. **1** is a perspective view of an automatic sheet feeder in accordance with a preferred embodiment of the present invention;

FIG. **2** is a partially perspective view of the automatic sheet feeder of FIG. **1**;

FIG. **3** is a perspective view of a transmission device assembled to the automatic sheet feeder of FIG. **1**;

FIG. **4** is another perspective view of the transmission device assembled to the automatic sheet feeder of FIG. **1**;

FIG. **5** is a perspective view of a one-way clutch of the transmission device assembled to the automatic sheet feeder of FIG. **1**; and

FIG. **6** is an exploded view of the one-way clutch of the transmission device assembled to the automatic sheet feeder of FIG. **5**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to FIG. **1** to FIG. **3**, a transmission device **100** in accordance with a preferred embodiment of the present invention is shown. The transmission device **100** is assembled to an automatic sheet feeder **200**. The automatic sheet feeder **200** has functions of scanning paper documents (not shown) and cards (not shown). The transmission device **100** includes a pickup roller assembly **10**, a feeding roller assembly **20**, a paper-out roller assembly **30**, and a driving motor **80** for driving the pickup roller assembly **10**, the feeding roller assembly **20** and the paper-out roller assembly **30**. In this preferred embodiment, a direction from a front end of the automatic sheet feeder **200** to a rear end of the automatic sheet feeder **200** is defined as a front-to-rear direction. When the driving motor **80** is seen from a left of the transmission device **100** of the automatic sheet feeder **200** shown in FIG. **3** to a right of the transmission device **100** of the automatic sheet feeder **200** shown in FIG. **3**, a clockwise direction is defined as a forward direction, and an anticlockwise direction is defined as a reverse direction, so a clockwise rotation of the driving motor **80** is defined as a forward rotation of the driving motor **80**, and an anticlockwise rotation of the driving motor **80** is defined as a reverse rotation of the driving motor **80**. When automatic sheet feeder **200** scans each of the paper documents, each of the paper documents is fed into the automatic sheet feeder **200** from the rear end of the automatic sheet feeder **200** and is transmitted out of the automatic sheet feeder **200** from the front end of the automatic sheet feeder **200**. When the automatic sheet feeder **200** scans each of the cards, each of the cards is fed into and transmitted out of the automatic sheet feeder **200** from the front end of the automatic sheet feeder **200**.

Referring to FIG. **2** to FIG. **6**, the feeding roller assembly **20** disposed between the pickup roller assembly **10** and the paper-out roller assembly **30**, includes a feeding roller **21** and a feeding shaft **22**. The feeding roller **21** is mounted around the feeding shaft **22**.

The paper-out roller assembly **30** includes a paper-out roller **31** and a paper-out shaft **32**. The paper-out roller **31** is mounted around the paper-out shaft **32**.

The transmission device **100** further includes a one-way drive gear module **40**, a first transmission gear module **50**, a second transmission gear module **60**, and a one-way clutch **70** disposed to one end of the feeding shaft **22** and one end of the paper-out shaft **32**. The pickup roller assembly **10**, the feeding roller assembly **20**, the paper-out roller assembly **30**, one-way drive gear module **40**, the first transmission gear module **50**, the second transmission gear module **60** and the one-way clutch **70** are assembled to the automatic sheet feeder **200** and driven by the driving motor **80**.

The one-way drive gear module **40** includes a first one-way drive gear **41** and a second one-way drive gear **42**. The second one-way drive gear **42** is mounted around the one end of the feeding shaft **22**, and the first one-way drive gear **41** is mounted around the other end of the feeding shaft **22**. When the first one-way drive gear **41** rotates in the forward direction, the first one-way drive gear **41** rotates in a single direction. When the first one-way drive gear **41** rotates in the reverse direction, the first one-way drive gear **41** idles. When the second one-way drive gear **42** rotates in the reverse direction, the second one-way drive gear **42** rotates in a single direction. When the second one-way drive gear **42** rotates in the forward direction, the second one-way drive gear **42** idles. So the first one-way drive gear **41** and the second one-way drive gear **42** rotate in different directions to drive the feeding shaft **22** to rotate.

The first transmission gear module **50** includes a plurality of transmission gears **501** disposed to the two ends of the feeding shaft **22** and two ends of the paper-out shaft **32**. The first one-way drive gear **41** mounted around the other end of the feeding shaft **22** is engaged with one of the transmission gears **501** of the first transmission gear module **50** disposed to the other end of the feeding shaft **22**. The driving motor **80** drives the first transmission gear module **50** to drive the first one-way drive gear **41** of the one-way drive gear

module **40** so as to drive the feeding roller assembly **20** to rotate in one direction. The driving motor **80** drives the first transmission gear module **50** to drive the paper-out roller assembly **30** to rotate in different directions.

Specifically, the plurality of the transmission gears **501** of the first transmission gear module **50** includes a driving gear **51** connected with the driving motor **80**, a first transmission gear **52**, a second transmission gear **53**, two third transmission gears **54** engaged with each other, a fourth transmission gear **55** fastened to and connected to the other end of the paper-out shaft **32**, a fifth transmission gear **56** and a sixth transmission gear **57**. The driving gear **51** is engaged with the first transmission gear **52**. The second transmission gear **53** is engaged with the first transmission gear **52**. The first one-way drive gear **41** is engaged with the second transmission gear **53**. One of the two third transmission gears **54** is engaged with the second transmission gear **53**, and the other third transmission gear **54** is engaged with the fourth transmission gear **55**. The first one-way drive gear **41** is fastened to the feeding shaft **22**. The fourth transmission gear **55** is fastened to the paper-out shaft **32**. So the feeding roller **21** and the driving motor **80** rotate in opposite directions, and the paper-out roller **31** and the driving motor **80** rotate in the opposite directions. The fifth transmission gear **56** is fastened to and connected to the other end of the feeding shaft **22** around which the second one-way drive gear **42** is mounted. The sixth transmission gear **57** is fastened to and connected to the one end of the paper-out shaft **32**.

The second transmission gear module **60** is disposed to one end of the pickup roller assembly **10**, and is engaged with one of the transmission gears **501** of the first transmission gear module **50** mounted around the one end of the feeding shaft **22**. The driving motor **80** drives the first transmission gear module **50** to drive the first one-way drive gear **41** to rotate in the one direction to drive the feeding shaft **22** to rotate in the one direction for driving the one of the transmission gears **501** of the first transmission gear module **50**, namely the fifth transmission gear **56** mounted around the one end of the feeding shaft **22** to drive the second transmission gear module **60** so as to drive the pickup roller assembly **10** to rotate in the one direction. Specifically, the second transmission gear module **60** includes a seventh transmitting gear **61**, and an eighth transmitting gear **62** engaged with the seventh transmitting gear **61**. The seventh transmitting gear **61** is engaged with the fifth transmission gear **56**. The eighth transmitting gear **62** is fastened to and connected to the one end of the pickup roller assembly **10**.

Referring to FIG. **2** to FIG. **6**, the one-way clutch **70** is disposed to the one end of the feeding shaft **22** and the one end of the paper-out shaft **32**, and the one-way clutch **70** is disposed between the feeding shaft **22** and the paper-out shaft **32**. The one-way clutch **70** includes a first clutch gear **71**, a second clutch gear **72**, a third one-way clutch gear **73** disposed between the first clutch gear **71** and the second clutch gear **72**, and a compression spring **74** disposed to one end of the second clutch gear **72**. The first clutch gear **71** is engaged with one of the transmission gears **501** of the first transmission gear module **50**, namely the sixth transmission gear **57** which is mounted around the one end of the paper-out shaft **32**. The second clutch gear **72** is engaged with the second one-way drive gear **42** which is mounted around the one end of the feeding shaft **22**.

Specifically, the first clutch gear **71** is engaged with the sixth transmission gear **57** which is mounted around the one end of the paper-out shaft **32**. The compression spring **74** presses the second clutch gear **72** to make the second clutch gear **72** avoid rotating when the third one-way clutch gear **73** idles. The third one-way clutch gear **73** is capable of being engaged with the second clutch gear **72** to make the second clutch gear **72** rotate in a single direction. The first clutch gear **71** has a first protruding portion **711** towards the second clutch gear **72**. The third one-way clutch gear **73** has an inclined surface **731** towards the first clutch gear **71**. When the first clutch gear **71** rotates until the first protruding portion **711** pushes against the inclined surface **731** of the third one-way clutch gear **73**, the first clutch gear **71** is capable of driving the second clutch gear **72** to rotate in the same direction.

The driving motor **80** is capable of driving the first transmission gear module **50** in dual directions, when rotation directions of the first transmission gear module **50** are different, the first transmission gear module **50** drive the pickup roller assembly **10** to generate different rotation directions by virtue of the second transmission gear **53** driving the two third transmission gears **54**. The driving motor **80** is capable of simultaneously driving the pickup roller assembly **10**, the feeding roller assembly **20** and the paper-out roller assembly **30**. The first one-way drive gear **41** and the second one-way drive gear **42** rotate in the different directions to drive the feeding shaft **22** to rotate in the different directions.

The driving motor **80** drives the first transmission gear module **50** to drive the first one-way drive gear **41** of the one-way drive gear module **40** to rotate in the one direction to drive the feeding shaft **22** of the feeding roller assembly **20** to rotate in the one direction, so that the second transmission gear module **60** is driven by the one of the transmission gears **501** of the first transmission gear module **50**, namely the fifth transmission gear **56** mounted around the one end of the feeding shaft **22** to rotate in the one direction, and the pickup roller assembly **10** is driven to rotate in the one direction. Simultaneously, the driving motor **80** drives the first transmission gear module **50** to drive the paper-out shaft **32** to rotate in the one direction, and when the driving motor **80** drives the second transmission gear **53** of the first transmission gear module **50** to drive the first one-way drive gear **41** to rotate in the other direction, the first one-way drive gear **41** idle, at the moment, the feeding shaft **22** is without rotating, the driving motor **80** drives the first transmission gear module **50** to drive the paper-out shaft **32** to rotate in the other direction, so that after the first clutch gear **71** is driven by one of the transmission gears **501**, namely the sixth transmission gear **57** mounted around the one end of the paper-out shaft **32** to rotate a set distance in the one direction, the third one-way clutch gear **73** is engaged with the second clutch gear **72** and drives the second clutch gear **72** to rotate in the one direction, and after the second one-way drive gear **42** is driven by the second clutch gear **72** to rotate a set distance in the other direction, the driving motor **80** changes a rotation direction, the driving motor **80** drives the first transmission gear module **50** to drive the feeding shaft **22** and the paper-out shaft **32** to rotate in the one direction.

Referring to FIG. **1** to FIG. **6**, an action process of the transmission device **100** and the automatic sheet feeder **200** scanning the paper documents is described as follows.

When the automatic sheet feeder **200** starts working, one of the paper documents enters the automatic sheet feeder **200** from the rear end of the automatic sheet feeder **200**. The driving motor **80** rotates in the reverse direction to drive the driving gear **51** to rotate in the reverse direction, the driving gear **51** drives the first one-way drive gear **41** and the fourth transmission gear **55** to rotate in the forward direction by

virtue of the first transmission gear **52**, the second transmission gear **53** and the two third transmission gears **54**, at the moment, the first one-way drive gear **41** is in an engagement status, the first one-way drive gear **41** is engaged with the second transmission gear **53**, the first one-way drive gear **41** and the fourth transmission gear **55** drive the feeding shaft **22** and the paper-out shaft **32** respectively to rotate in the forward direction to convey the one of the paper documents, the first one-way drive gear **41** and the fifth transmission gear **56** rotate in the forward direction, the fifth transmission gear **56** is engaged with the seventh transmitting gear **61** and drives the seventh transmitting gear **61** to rotate in the reverse direction, the seventh transmitting gear **61** is engaged with the eighth transmitting gear **62** and drives the eighth transmitting gear **62** to rotate in the forward direction, the eighth transmitting gear **62** drives the pickup roller assembly **10** to rotate in the forward direction, the pickup roller assembly **10** rotates in the forward direction to pick up the next paper document to and the next paper document enters the automatic sheet feeder **200** from the rear end of the automatic sheet feeder **200**.

At the moment, the second one-way drive gear **42** is in a status of breaking away an engagement, the second one-way drive gear **42** breaks away from the second clutch gear **72**, when the second one-way drive gear **42** rotates in the forward direction, the second one-way drive gear **42** rotates idles, so a torque is without being transmitted to the feeding shaft **22**. The paper-out shaft **32** rotates in the forward direction to drive the sixth transmission gear **57** to rotate in the forward direction so as to drive the first clutch gear **71** to rotate in the reverse direction, at the moment, the first clutch gear **71** is in a status of breaking away an engagement, the first clutch gear **71** breaks away from the sixth transmission gear **57**, so that the second clutch gear **72** will be without being driven to rotate, and simultaneously, the second clutch gear **72** is pressed by the compression spring **74**, so the second clutch gear **72** is without rotating. The feeding shaft **22** and the paper-out shaft **32** rotate in the forward direction so as to convey the one of the paper documents out of the automatic sheet feeder **200** from the front end of the automatic sheet feeder **200**.

Referring to FIG. **1** to FIG. **6**, an action process of the transmission device **100** and the automatic sheet feeder **200** scanning the cards is described as follows.

When the automatic sheet feeder **200** starts working, one of the cards enters the automatic sheet feeder **200** from the front end of the automatic sheet feeder **200**. The driving motor **80** rotates in the forward direction to drive the paper-out roller **31** to rotate in the reverse direction by virtue of the first transmission gear module **50** so as to convey the one of the cards starts entering the automatic sheet feeder **200** from the front end of the automatic sheet feeder **200**, at the moment, the first one-way drive gear **41** is in a status of breaking away an engagement, the first one-way drive gear **41** breaks away from the second transmission gear **53**, so the first one-way drive gear **41** is without driving the feeding shaft **22** to rotate, and the second clutch gear **72** is pressed by the compression spring **74**, so the second clutch gear **72** is without rotating, and the second one-way drive gear **42** is without being driven.

The paper-out shaft **32** rotates in the reverse direction to drive the sixth transmission gear **57** to rotate in the reverse direction so as to drive the first clutch gear **71** to rotate in the forward direction by virtue of the second transmission gear module **60**, at the moment, because the first protruding portion **711** is without contacting with the inclined surface **731**, the first protruding portion **711** is incapable of pushing against the third one-way clutch gear **73**, so that the first clutch gear **71** rotates in the forward direction to idle and is without driving the second clutch gear **72** to rotate. The one of the cards is continued being driven by the paper-out shaft **32** to arrive at the feeding roller **21** which is without rotating in the front-to-rear direction. At the moment, the first clutch gear **71** still idles, the feeding shaft **22** is still without rotating, the paper-out shaft **32** continues driving one of the cards to move in the front-to-rear direction, the one of the cards occurs a slip phenomenon to make a rear end of the one of the cards push against the feeding roller **21** for realizing a function of correcting a skew of the one of the cards.

After the first clutch gear **71** completes idling, the first protruding portion **711** of the first clutch gear **71** starts pushing against the inclined surface **731** of the third one-way clutch gear **73** so as to drive the second clutch gear **72** to rotate in the forward direction. The second clutch gear **72** is engaged with the second one-way drive gear **42** and drives the second one-way drive gear **42** to rotate in the reverse direction so as to drive the feeding shaft **22** to rotate in the reverse direction and the first one-way drive gear **41** to rotate in the reverse direction to make the first one-way drive gear **41** idle, namely when the first one-way drive gear **41** rotates in the reverse direction, the first one-way drive gear **41** is in the idling status. The feeding roller **21** and the paper-out roller **31** rotate in the reverse direction to drive one of the cards to continue being conveyed in the front-to-rear direction until the rear end of the one of the cards breaks away from the feeding roller **21**, the driving motor **80** stops rotating in the forward direction, and the feeding shaft **22** stops rotating in the reverse direction. Then, the driving motor **80** starts rotating in the reverse direction, the feeding roller **21** and the paper-out roller **31** are driven by the first transmission gear module **50** to rotate in the forward direction so as to convey the one of the cards to proceed being scanned until the one of the cards completes being scanned, the one of the cards is transmitted out from the front end of the automatic sheet feeder **200**.

As described above, the driving motor **80** rotates in the reverse direction to drive the first transmission gear module **50** to drive the first one-way drive gear **41** rotate in the forward direction so as to drive the feeding roller **21** and the paper-out roller **31** to rotate in the forward direction, the fifth transmission gear **56** of the first transmission gear module **50** drives the pickup roller assembly **10** to rotate in the forward direction by the second transmission gear module **60**, and the feeding roller **21** and the paper-out roller **31** rotate in the forward direction, the one of the paper documents is conveyed successfully to be scanned. The driving motor **80** rotates in the forward direction to drive the paper-out roller **31** to rotate in the reverse direction by virtue of the first transmission gear module **50**, the first one-way drive gear **41** rotates in the reverse direction to make the first one-way drive gear **41** idle to have no way of driving the feeding roller **21** to rotate in the reverse direction, and the first clutch gear **71** is driven to rotate in the forward direction by virtue of the second transmission gear module **60** to bring the one of the cards enter the automatic sheet feeder **200**, the one of the cards is driven to arrive at the feeding roller **21** which is without rotating, the rear end of the one of the cards pushes against the feeding roller **21** for realizing the function of correcting the skew of the one of the cards, after the first clutch gear **71** is driven rotate the set distance, the first protruding portion **711** of the first clutch gear **71** pushes against the inclined surface **731** of the third one-way clutch gear **73** to make the third one-way clutch gear **73** engaged

with the second clutch gear **72** and drive the second clutch gear **72** to rotate in the forward direction and drive the second one-way drive gear **42** and the feeding shaft **22** to rotate in the reverse direction so as to drive the first one-way drive gear **41** rotate in the reverse direction to make the first one-way drive gear **41** idle, the feeding roller **21** and the paper-out roller **31** rotate in the reverse direction to drive the one of the cards to continue being conveyed until the rear end of the one of the cards breaks away from the feeding roller **21**, the driving motor **80** stops rotating in the forward direction, then, the driving motor **80** starts rotating in the reverse direction, the feeding roller **21** and the paper-out roller **31** are driven by the first transmission gear module **50** to rotate in the forward direction so as to convey the one of the cards to proceed being scanned until the one of the cards completes being scanned, the one of the cards is transmitted out from the front end of the automatic sheet feeder **200**. Moreover, the transmission device **100** of the automatic sheet feeder **200** is equipped with just the driving motor **80** which is capable of simultaneously driving the pickup roller assembly **10**, the feeding roller assembly **20** and the paper-out roller assembly **30** to avoid the transmission device **100** using more motors, so a manufacturing cost of the transmission device **100** will be decreased, and a volume of the transmission device **100** is easily miniaturized.

What is claimed is:

1. A transmission device assembled to an automatic sheet feeder, comprising:

a pickup roller assembly assembled to the automatic sheet feeder;

a feeding roller assembly assembled to the automatic sheet feeder, including a feeding shaft, and a feeding roller mounted around the feeding shaft;

a paper-out roller assembly assembled to the automatic sheet feeder, including a paper-out shaft, and a paper-out roller mounted around the paper-out shaft;

a driving motor for driving the pickup roller assembly, the feeding roller assembly and the paper-out roller assembly;

a one-way drive gear module driven by the driving motor, including a first one-way drive gear and a second one-way drive gear, the second one-way drive gear being mounted around one end of the feeding shaft, and the first one-way drive gear being mounted around the other end of the feeding shaft, the first one-way drive gear and the second one-way drive gear rotating in different directions to drive the feeding shaft to rotate;

a first transmission gear module including a plurality of transmission gears disposed to the two ends of the feeding shaft and two ends of the paper-out shaft, the first one-way drive gear being engaged with one of the transmission gears disposed to the other end of the feeding shaft, the driving motor driving the first transmission gear module to drive the first one-way drive gear so as to drive the feeding roller assembly to rotate in one direction, the driving motor driving the first transmission gear module to drive the paper-out roller assembly to rotate in different directions;

a second transmission gear module disposed to one end of the pickup roller assembly, and being engaged with one of the transmission gears of the first transmission gear module mounted around the one end of the feeding shaft, the driving motor driving the first transmission gear module to drive the first one-way drive gear to rotate in the one direction to drive the feeding shaft to rotate in the one direction for driving the one of the transmission gears of the first transmission gear module mounted around the one end of the feeding shaft to drive the second transmission gear module so as to drive the pickup roller assembly to rotate in the one direction; and

a one-way clutch driven by the driving motor and disposed to the one end of the feeding shaft and one end of the paper-out shaft, and disposed between the feeding shaft and the paper-out shaft, the one-way clutch including a first clutch gear, a second clutch gear, a third one-way clutch gear disposed between the first clutch gear and the second clutch gear, and a compression spring disposed to one end of the second clutch gear, the first clutch gear being engaged with one of the transmission gears of the first transmission gear module which is mounted around the one end of the paper-out shaft, the second clutch gear being engaged with the second one-way drive gear which is mounted around the one end of the feeding shaft, the compression spring pressing the second clutch gear to make the second clutch gear avoid rotating when the third one-way clutch gear idles, the third one-way clutch gear being capable of being engaged with the second clutch gear to make the second clutch gear rotate in a single direction.

2. The transmission device as claimed in claim **1**, wherein the plurality of the transmission gears of the first transmission gear module include a driving gear connected with the driving motor, a first transmission gear, a second transmission gear, two third transmission gears engaged with each other, and a fourth transmission gear fastened to and connected to the other end of the paper-out shaft, the driving gear is engaged with the first transmission gear, the second transmission gear is engaged with the first transmission gear, the first one-way drive gear is engaged with the second transmission gear, one of the two third transmission gears is engaged with the second transmission gear, and the other third transmission gear is engaged with the fourth transmission gear.

3. The transmission device as claimed in claim **1**, wherein the plurality of the transmission gears of the first transmission gear module further include a fifth transmission gear and a sixth transmission gear, the fifth transmission gear is fastened to and connected to the other end of the feeding shaft around which the second one-way drive gear is mounted, the sixth transmission gear is fastened to and connected to the one end of the paper-out shaft, the second transmission gear module includes a seventh transmitting gear, and an eighth transmitting gear engaged with the seventh transmitting gear, the seventh transmitting gear is engaged with the fifth transmission gear, the first clutch gear is engaged with the sixth transmission gear.

4. The transmission device as claimed in claim **1**, wherein the first clutch gear has a first protruding portion towards the second clutch gear, the third one-way clutch gear has an inclined surface towards the first clutch gear, when the first clutch gear rotates until the first protruding portion pushes against the inclined surface of the third one-way clutch gear, the first clutch gear is capable of driving the second clutch gear to rotate in the same direction.

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